

December 13, 1954

TENTATIVE PLANNING FOR PHOTO EQUIPMENT**1. Configuration A.**

This will consist of various combinations of more or less standard aerial photographic equipment, though selected and put into optimum condition. For example:

Combination 1. Standard Tri-Met arrangement in crabbing mount with sufficient film to last through the longest mission. Together with two K-36-type cameras, usually with 24-inch lenses, but taking also 12 and 36-inch lenses. Film capacity will accommodate almost complete coverage with the 12-inch, about half with the 24-inch and only about one-quarter with 36-inch lenses. The K-36's are intended mostly for oblique coverage on either side of the central 6-inch of the Tri-Met, but can be tilted as needed from near the vertical to near the horizon. All cycling will employ 60% overlap.

Combination 2. The Tri-Met is replaced by two 12-inch cameras in split vertical. The rest will be as above. Coverage will be almost complete with the 12-inch cameras. This combination is essentially a multi-station installation, with the longer focal lengths used obliquely. The mission is to cover 3600 miles at altitude.

2. Configuration B.

This will consist of a single 36-inch (later 48-inch) lens, giving 9x18 coverage on 18-inch wide film, with 60% overlap. The optical system is fed by a cube prism, cycled transversely to give nearly horizon to horizon coverage, though more restricted transverse coverage can also be programmed. The film spools will handle about 4000' of standard film, and perhaps 7000' of thin base film. With the latter (and 36-inch lens), the coverage can be up to 100% along the line of flight, if the lateral coverage is slightly limited. This system is intended for reconnaissance. If standard film is used, the coverage will be correspondingly limited.

This camera is intended to be the workhorse, combining large area coverage with intermediate scale.

There will also be a charting camera accompanying all flights not having a Tri-Met. Plans are not definitized as yet, but probably the charting camera will take the form of a Tri-Met on a single roll of film. 5½-inch film will probably be used and the picture will be perhaps 9-inches along the roll from horizon to horizon. The oblique views will be taken with longer focal length lenses, say 6-inch lenses, and the vertical view with probably a 3-inch wide angle lens. The oblique views will be fed through fixed prisms. The shutters will be standard between-the-lens shutters operated simultaneously. The vertical pictures will have 60% overlap.

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3. Configuration C

This will consist of a 240-inch f/20 optical system feeding the same magazine arrangement as in Configuration B. However, the film spools will be somewhat smaller. This long focal length system is intended for large scale pictures of limited areas, and is pointed by servo, aligned with the pilot's periscope sweep. The pilot looks into his periscope, which has a transverse sweep, with either 25 or 50 degree field at any one glance. The camera is always pointing to whatever is on the cross-wire of the periscope. The pilot pushes an exposure button whenever he sees something of interest and brings it to the cross-wire. The camera then takes a set of pictures around that area, either 2, or 4 or 8, with 60% overlap, according to the pilot's direction.

The pilot either can be briefed on what to photograph from studies of the smaller scale photography earlier, or else can simply go hunting. He can pick out individual towns or cities, or cover a river bank for many miles, and so forth. The camera will show perhaps 20 times the return of what the pilot can glimpse in terms of resolution, and hence the instructions to the pilot should be in terms of gross detail, and prominent landscape features.

The 240-inch on the average should resolve objects of the order of a foot in size on the vertical, up to several feet 40 miles off the vertical, to several dozen feet at 100 miles off the vertical.

There will be certain ground equipment provided in addition to the usual processing. For example, a projector will be provided for the charting camera. Collimators will be provided for aid in checking focus in the field.

Special films will be used if haze is a serious problem, along with photo-electric iris or shutter control. All cameras will have IMC, and will be in damped, vibration-filtered mounts. Only the Tri-Met will have crabbing control. No camera will have tilt control. The airplane is supposed to fly within 1 degree of vertical in roll and pitch, and to maintain a true flight line with about the same degree of precision.

Cameras will be thermostated. The film will be heated and proper humidity obtained in the back focus space. Extreme attention will be given to keeping the windows clear. The highest possible resolution will always be sought for, and hopefully, better than 20 lines/mm. Fine-grained film will be used when illumination permits. Vignetting will be minimized. The lenses will generally be used at f/8 or slower, except where illumination requires maximum aperture.

On excellent photographic days it is anticipated that haze will not be serious over a band 100 miles wide. With the 36-inch Configuration B

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a useful strip up to 200 miles wide can be expected. With the spotting camera, some results might be available over a band 250 miles wide. However, vertical coverage will always be desirable for any camera, over important targets, or, the more nearly vertical, the better.

[It should be anticipated that the pilot may have to stay in clear areas where the weather front has been inaccurately predicted. He ought to be able to spot bad weather 100 miles ahead and redirect his flight to stay in the clear. Hence, alternate target areas should be assigned.

More detailed descriptions will be available several weeks from now.

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